TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, NOVEMBER 1938

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Typhoon, November 1–11, 1938.—A depression appeared November 1 about 120 miles southwest of Yap, moved west-northwest to latitude 10 where it changed its course to the west, increasing in strength as it proceeded. It approached Surigao Strait during the forenoon hours of November 4, crossed northern Leyte on a west by north course, continued on to Panay Island and entered the extreme northern portion of the Sulu Sea. As the storm approached the China Sea, it passed north of Cuyo and south of Culion, moving west by north and inclining to the west.

The morning weather map, November 5, showed the center to be about 60 miles west-southwest of Culion and very much stronger. It continued along a westerly course during the forenoon and changed to the west-northwest and northwest during the afternoon and evening, thus approaching the Paracel Islands and Reefs, where it moved in a northerly direction, but more slowly. On November 8, it changed to the west, inclined to the northwest, passed over Hainan Island and disappeared over the Gulf of Tong King.

As this disturbance passed over the Visayan Islands on its way from the Pacific Ocean to the China Sea, the strongest winds reported were those from the east-southeast or southeast after the center had passed the locality. At noon, Manila time, the S. S. *Taurus* reported "latitude 11°50′ N. longitude 125°40′ E., barometer 29.62, temperature 81, winds east-southeast 8, fresh gales from east-southeast, very heavy sea"; the center being at this time about 100 miles south-southwest of the ship's position. At 6 p. m. Manila time, Tacloban, Leyte, had east-southeast winds force 7, when the center was about 150 miles west of the locality. The lowest pressures reported were between 748 and 750 mm (29.449 and 29.528 in.) with winds not exceeding force 5 over regions adjacent to the center. For example, Capiz and Iloilo, both on Panay Island, had pressures of 749.6 mm (29.512 in.); Capiz with east-northeast winds force 4 and Iloilo with west winds force 2 (6 p. m. Manila time), the center being between the two stations. However, considerable rain fell while this storm was crossing the Archipelago, but no extensive damage was reported.

Intensification of the storm in the China Sea is best shown by the weather reported from the Paracel Island station. Winds backed from north-northeast to north-northwest, west-northwest, and west-southwest, as the storm center passed about 100 miles east-northeast of the station, on its northwesterly course. The winds were force 9 and the lowest barometer reported for synoptic purposes was 744.4 mm (29.308 in.) at 6 a. m. November 7.

During the formation of this disturbance, the upper winds from the U. S. Navy Station at Guam showed the presence of air streams from east-northeast and east directions with velocities about 30 k. p. h., which, after November 1, gradually shifted to the east-southeast, as velocities increased to values close to 50 k. p. h. As the disturbance approached and crossed the Philippines, there was scarcely any evidence of a southwest monsoon current. Only until the center entered the China Sea did southwest quadrant winds appear at Zamboanga. The remaining Philippine aerological stations had Northeast quadrant winds shifting to the southeast as the center moved toward the China Sea, velocities between 50 and 80 k. p. h. being reported from Manila and Cebu.

Depression, November 10–18, 1938.—About 300 miles south-southwest of Guam a depression appeared on November 10, moved west by north, then west to the regions about 400 miles east of Samar Island. There it recurved to the northeast, November 12, changing to north, then north-northeast, and moving more rapidly as it proceeded. Observations were not available for determining its history after it reached the ocean regions east of northern Japan, November 18. Furthermore, as well as could be determined from available data, the storm was not of very great intensity over a wide area.

At Guam, the upper winds during the formation of this depression veered from east and east-northeast directions, with velocities between 30 and 50 k. p. h., to the southeast, increasing to values as high as 70 k. p. h., as the depression moved west-northwest between that station and Yap. The air streams over the Philippines and the China Sea as the depression recurved (November 12) showed that the southwest winds which started with the preceding typhoon were extending toward the Pacific by way of Zamboanga, but were checked by a strong outbreak of northerly air, caused by a distant depression in the locality of Japan. This current of cool heavy air reached San Bernardino Strait and most likely caused the Pacific depression to recurve, as well as checking the southwest winds which were gradually strengthening over Zamboanga.

Typhoon, November 21–27, 1938.—A disturbance appeared about 250 miles west-northwest of Palau, moved westerly, then northwesterly, to the 10th parallel of latitude where it changed its course to the west, moving rapidly across the Visayan Islands as a depression. The morning of November 24 found the center located about 60 miles west of northern Palawan, already intensifying into a typhoon. Continuing along a westerly course for a day, it then shifted to the west-northwest when about 300 miles east of southern Indo China. It entered Indo China near Quinhon on the afternoon of November 27, after which no trace of it could be found.

On November 23, this disturbance crossed the Visayan Islands as a widely extended depression, with no definite center, with weak variable winds, and pressure values between 753 and 754 mm. (29.646 and 29.686 in.), on the morning map, and between 752 and 753 mm. (29.607 and 29.646 in.), on the afternoon map. Zamboanga reported the strongest winds, west-southwest force 4, from the southern Philippine stations during this period. Over northern Luzon, however, very heavy rains set in especially along the coast and over the length of the Cagayan River, these rains caused by strong northeast monsoon winds with a southeasterly current aloft. Extensive destructive floods resulted, but with hardly any loss of life.

Observations from the S. S. *Tjisaroea* and S. S. *Silvermaple* show the intensification of this storm, once it reached the regions of the China Sea. These ships were hove to about 150 to 200 miles from the storm center as it approached the southern coast of Indo China, November 25 and 26. They had winds of force 9 (the *Silvermaple* reporting force 11 once) from the northwest quadrant, and backing to the west-southwest as the center moved north of their positions. Pressure values were between 749.3 and 751.5 mm (29.501 and 29.587 in.) during this period. Ships over the northern part of the China Sea reported northeast winds force 5, 6, and 7 as the typhoon moved from the Philippines to Indo China. It can be seen that the storm intensified to a typhoon of considerable power once it moved away from the Philippines.

The pilots of November 18 to 20 indicated the existence of two currents, one from the east, velocities from 30 to 50 k. p. h., the other from the west, velocities 20 to 40 k. p. h. and the equatorial regions separating these currents. The easterly current, as shown by pilots from Guam, increased in strength and very likely the westerly current over Java and Sumatra acted the same way. It was a situation where a disturbance might form, except for the fact that the region of formation was too close to the equator. It is a period very interesting to study, for the activity of the air streams can be examined without the complications of a violent typhoon interfering. After the disturbance formed west-northwest of Palau, the two currents continued in existence, that over Java being very strong, judging by the upper winds from Batavia, which were consistently (as often as reported) over 50 k. p. h. When, on November 24 and 25, the center reached the China Sea, and the rapid intensification began, the upper winds over Zamboanga changed to the southwest and south quadrants, with velocities up to 60 k. p. h., thus indicating that the westerly winds over Java might be deflected to the regions of the Celebes Sea and the southern part of the Sulu Sea. Usually the southwest monsoon air reaches the typhoon center after passing over the regions of the Straits Settlements, but, from the few pilots available at present writing, it seems that the intensification of this typhoon took place as described above.

Typhoon, November 26–December 2, 1938.—As a depression, this storm moved from the ocean regions between Mindanao and Palau along a west-northwesterly course, inclining to the northwest as the center approached Samar Island. It gave evidence of having typhoon strength as it moved along this course over northern Samar and across the western part of San Bernardino Strait during the night of November 28 and the morning hours of November 29. It inclined to the west by north as it moved across the northern Visayan Islands, but, in the China Sea, it had a west-northwest inclination. Until the afternoon hours of December 1, it moved west-northwest, when it changed to the west, then southwest, passing about 100 miles south of the Macles Field Reefs. During the night of December 2, the storm disappeared over southern Indo China.

As this storm crossed the Archipelago, it could be classified as a typhoon of moderate intensity; as the lowest barometer reading reported for the weather maps was 749.2 mm. (29.497 in.), from Boac, Marinduque, and three stations had winds of force 6, namely Masbate, direction southwest, Atimonan, direction north, and Batangas, direction east. In the China Sea, however, it did not manifest the power of the previous storm. A very significant observation was that of the S. S. *Conte Verde* December 1, 2 p. m. Manila time, from latitude 16° 47′ N, longitude 110° 41′ E, barometer 750 mm. (29.528 in.), winds north-northeast force 6, steady, sea 6, swell none, visibility 6, weather cloudy. (At the time, the typhoon was located near latitude 15°, longitude 115°).

It is probable that the southwesterly current starting with the previous typhoon moved up to Surigao and locality and then into the Pacific Ocean, where interaction took place with the easterly current over those regions. This may have been a contributing factor to the formation of the disturbance.

The three China Sea typhoons of this month exemplify the statement made by Jeffries and Heywood in "The Law of Storms in the China Sea" 1938, (p. 23), that the westerly current, which begins during the month of October at heights above 6,000 to 10,000 feet, does not allow a typhoon center to approach the locality from the east. During the whole month of November, the pilots from Indo China and Hong Kong indicated that this high westerly current was in existence and, at the same time, the three typhoon centers did not seriously threaten northern Indo China and Hong Kong.